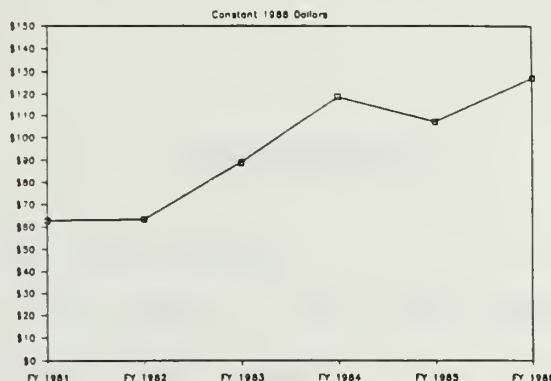


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# KEY TRENDS, IN MASSACHUSETTS ACUTE HOSPITALS 1981 - 1986



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A Report of the  
Massachusetts Rate Setting Commission

May 1987





KEY TRENDS IN MASSACHUSETTS ACUTE HOSPITALS  
1981 - 1986

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## EXECUTIVE SUMMARY

In this report, the Massachusetts Rate Setting Commission presents a comprehensive study of financial and utilization indicators associated with the acute care hospital industry in Massachusetts. The study, which spans fiscal years 1981 through 1986, covers the period of time both before and after implementation of the state's hospital payment system, known as Chapter 372. The system was implemented in fiscal year 1983.

The analyses, tables, and figures which follow evaluate and display historical trends for several variables which describe the acute care hospital system. The six year time span covered by the study focuses on a period which experienced frequent change in the legislative/regulatory environment for hospitals. A patchwork system of regulation in 1981-82 gave way to the all-payer system established by Chapter 372 (1983-85). The all-payer system in turn was modified by Chapter 574 (1986), in response to the adoption of the federal "DRG system" for Medicare and the creation of an "uncompensated care pool" to help pay for hospital bad debt and free care. The data presented illustrate the strong and generally improving financial position of the industry under current regulation, despite dramatic declines in patient volume. While total expenses and revenues are now growing at rates only modestly in excess of the overall rise in prices, revenue per unit (whether measured on a day or discharge basis) continues to increase rapidly. (The latter phenomenon may be at least partially explained by increased complexity in the mix of services provided.)

The report is divided into separate sections on margin, volume, cost, charges, net patient service revenue, and uncompensated care, with a concluding technical appendix on data sources and methodology. All dollar amounts are expressed in terms of constant 1986 dollars in order to eliminate the impact of general price inflation from the analysis. Note that Boston City Hospital is generally excluded from this analysis; see the technical appendix for an explanation.

The key results of the study are as follows:

Financial Performance. The acute hospital industry has improved its financial viability. In constant dollars, the excess of revenue over expenses (also known as total margin or profit) grew from \$62 million in 1981 to \$127 million in 1986. At the same time, operating losses of \$24 million in 1981 were transformed into an operating surplus of \$31 million in 1986.



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During this time the percentage of hospitals with a positive "bottom line" grew from 66% to 77%.

Volume. As detailed in Table A below, all measures of volume have shown a dramatic decline. Patient days dropped by almost 18 percent, discharges by over 5%, and length of stay by 13%. The changes have produced a 19% decline in occupancy rates, with actual occupancy rates dropping 15 percentage points from 81% in 1981 to 66% in 1986. Case mix intensity is not examined, but will be reported on at a later date.

Table A

Changes in Inpatient Volume 1981-86

Inpatient Days	-17.61%
Discharges	-5.36
Length of Stay	-12.84
Occupancy Rate	-19.27

Total Expenses and Revenues. As shown in Table B [see p.3], total operating expenses and all three measures of total revenues have increased by amounts ranging from 15% to more than 23% over inflation over the six year study period. As detailed in the body of the report, the most significant increases in each of these measures occurred prior to the implementation of Chapter 372.

Unit Charges and Unit Net Revenue. The combination of (1) the decline in volume with (2) the increases in charges and net revenue has resulted in very substantial increases in per unit





charges and net revenue [see Table C below]. In the most dramatic example, charges per adjusted patient day grew by almost 40% over inflation between 1981 and 1986. (The adjusted patient day statistic is a measure that incorporates both inpatient and outpatient volume; it does not reflect changes in case mix intensity). The change that occurred in 1985-1986 in charges per adjusted patient day, largely driven by the volume decline, was similar in measure to the change that occurred in 1981-1982, which was largely driven by an increase in charges.

Table B

Changes in Total Expenses and Total Revenue, 1981-86

1986 Constant Dollars

Operating Expenses	+ 15.01%
Operating Revenues	+ 16.57
Charges	+ 23.56
Net Patient Service Revenue	+ 18.49

Table C

Changes in Per Unit Measures, 1981-86

1986 Constant Dollars

Charges per Adjusted Patient Day	+ 39.61%
Charges per Adjusted Discharge	+ 20.98
NPSR per Adjusted Patient Day	+ 33.89
NPSR per Adjusted Discharge	+ 16.02

Note: NPSR = net patient service revenue

Bad Debt and Free Care. The increase in bad debt and free care (referred to as "uncompensated care") in acute hospitals in recent years has risen the most significantly of any of the measures of the industry. Since 1982, bad debt and free care rose by 55%, as measured by the budgeted costs utilized in the hospital payment system.



## ANALYSIS OF KEY VARIABLES

I. Margin--Information on the balance between acute hospital cost and revenue is given in Tables 1A, 1B, and 2, and Figures 1A, 1B, and 2. The improvement over time in both operating and total margin is marked. The total excess of revenues over expenses doubled in five years, from \$63 million to \$127 million. The sharp increase in the total margin percentage over time is also clearly delineated in Table 1A; by 1986, hospital revenues were nearly three percent greater than cost. This trend is not altered when non-operating revenues are excluded. Between 1981 and 1986 an operating loss of nearly \$25 million was converted into an operating surplus of nearly \$32 million (constant dollars).

Table 2 shows that a strong majority of acute hospitals are sharing in this prosperity. In 1981 about sixty-six percent of all hospitals had revenues greater than costs (positive total margin). By 1984 this proportion had increased to more than seventy-seven percent, and it changed very little over the next two years. The only change in 1986 was that the difference between profitable and unprofitable hospitals increased. In other words, hospitals with positive margin had higher margin rates, and hospitals with negative margin had greater loss rates. Overall, only six hospitals (of the ninety-six for which FY86 data is available) failed to generate a positive total margin in at least two of the last four years, i.e., that part of the study period covered by the Chapter 372/574 system. Thus, it appears that the current regulatory system is not a barrier to the financial viability of Massachusetts acute hospitals.

II. Volume--Information on inpatient volume trends is given in Tables 3A/3B and 3C/3D, and in Figures 3A, 3B, 3C, and 3D. The decline in volume, strongly encouraged by regulatory incentives, has been one of the major driving forces for the acute hospital industry. Annual discharges reached a peak of more than 926,000 in 1983, and fell steadily to 863,000 by 1986. Annual inpatient days peaked earlier (1982) at 7.7 million, fell over the next two years, and plummeted between 1984 and 1986. In these last two years, the annual rate of decrease in inpatient days was nearly seven percent. Thus, the 6.3 million inpatient days of 1986 represented a loss of 950,000 from the 1984 figure. The fall in patient days outstripped the fall in discharges due to the sharp decline in length of stay, from 8.4 days in 1981 to 7.3 days in 1986. The decline in occupancy rates for acute hospitals was also marked, falling from more than 81 percent in 1981 to 75 percent in 1984 to only 65 percent in 1986.





III. Cost--Information on hospital operating expense/cost (in constant dollars) is given in Table 4A, and in Figure 4A. Note that operating cost, by definition, includes both patient and non-patient expenditures. Total operating cost, in constant 1986 dollars, rose from \$3.9 billion in 1981 to \$4.5 billion in 1986, with nearly half of the increase concentrated at the start of the period (1981-82), before the implementation of Chapter 372. It is important to note that hospital expenses have not declined; only the rate of increase has moderated. Comparison with Table 4B, which gives information on operating revenue, clearly shows that hospital operations, which were a financial drain at the start of the study period, now produce a substantial surplus.

IV. Charges--Information on acute hospital charges is given in Tables 5A and 5B/5C, and in Figures 5A, 5B, and 5C. Total charges (in constant 1986 dollars) increased by more than one billion dollars between 1981 and 1986, from \$4.37 billion to \$5.39 billion. As was true for cost, a large part (\$440 million) of this change occurred before the implementation of Chapter 372, in the 1981-82 period. Since then, rates of increase have been more modest. This same pattern also prevailed for charges per adjusted discharge, with \$330 of the total 1981-86 change (from \$3,856 to \$4,665) taking place during the first study year. Charges per adjusted day, on the other hand, rose rapidly throughout the period from \$459 in 1981 to \$641 in 1986, with especially large increases occurring between 1981 and 1982, and between 1985 and 1986 (more than nine percent in each case). These recent increases in per unit charges may be partly due to an acceleration in changes in case mix. This change in charges per adjusted day has prevented the decline in average length of stay from being reflected in smaller bills for patients.

V. Net Patient Service Revenue--Information on reimbursement received by hospitals for patient services is given in Tables 6A and 6B/6C, and in Figures 6A, 6B and 6C. In interpreting this data, it is useful to note that hospitals have two other revenue sources--"other operating" and "non-operating"--so that total hospital revenue is not fully reflected in this section. Information on total operating revenue (which is the sum of net patient service revenue and other operating revenue) is given in Table 4B, and Figure 4B. Between 1981 and 1986, net patient service revenue rose from \$3.6 billion to \$4.2 billion. As was true for other key variables, a large proportion of this increase (nearly \$300 million) occurred during the 1981-82



period, prior to Chapter 372. The rate of change for net patient service revenue fell steadily from nearly eight percent between 1981 and 1982, to only one percent between 1984 and 1985. This pattern was reversed in the 1985-86 period, with a two percent growth rate. Such a turnaround is one indication that the switch to the DRG system for Medicare, instituted in this state in 1986, was beneficial to the hospitals. This view is supported by a number of federal studies concerning the financial impact of the DRG system nationally.

Net patient service revenue per adjusted discharge rose consistently, climbing by more than \$500 (to \$3,651) over the six year period. Net patient service revenue per adjusted patient day rose more rapidly (by more than one-third between 1981 and 1986), with the fastest annual increases occurring at the beginning and end of the study period (more than seven percent for both 1981-82 and 1985-86). The contrast between the per diem and per discharge results reflects the decline in average length of stay during the study period.

VI. Uncompensated Care Costs--Information concerning the uncompensated care costs incurred by hospitals is given in Tables 7A and 7B, and in Figure 7. Unlike the other analyses in this report, Boston City Hospital is included in the study of uncompensated care costs due to its major role in this area. Table 7A gives the actual writeoff for bad debt and free care, which in constant 1986 dollars increased by more than one-half between 1982 and 1986. This writeoff reached a peak figure of \$315 million in the latter year. Due to the interest in the financing of uncompensated care, we have included Table 7B which summarizes the most recent version (March, 1987) of the 1986 uncompensated care pool calculation.





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Summary tables displaying "Changes In Inpatient Volume, 1981-86" and "Changes in Revenue, Expenses, and Charges, 1981-86" are included in the "Executive Summary" of this report (see pages 2 and 3).



MASSACHUSETTS RATE SETTING COMMISSION

Table 1A

Acute Hospital Excess of Total Revenue Over Expenses, 1981-86

Constant 1986 Dollars

Fiscal Year	Excess of Total Revenue Over Expenses	As Percentage of Operating Expenses
1981	\$62,860,654	1.60%
1982	63,428,179	1.51
1983	89,011,958	2.06
1984	118,676,793	2.71
1985	107,269,641	2.43
1986	127,187,020	2.82

Table 1B

Acute Hospital Net Income From Operations, 1981-86

Constant 1986 Dollars

Fiscal Year	Net Income From Operations	As Percentage of Operating Expenses
1981	-\$24,955,750	-0.64%
1982	- 31,806,306	-0.76
1983	14,919,311	0.35
1984	41,576,795	0.95
1985	24,929,268	0.56
1986	31,830,200	0.71

Note: All of the above tables exclude Boston City Hospital.



# Excess Of Total Revenue Over Expenses

Constant 1986 Dollars

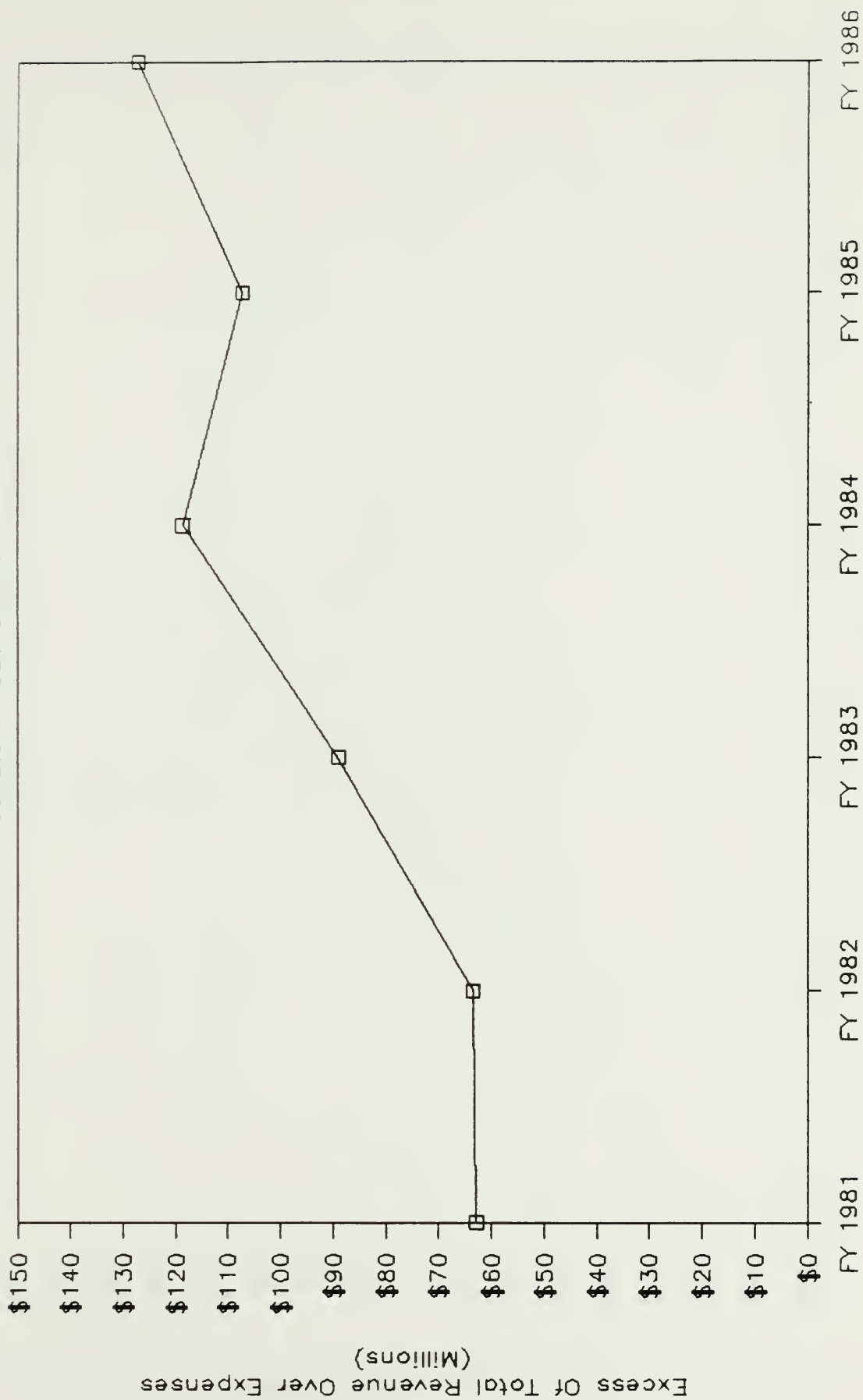


Figure 1A





# Net Income From Operations

Constant 1986 Dollars

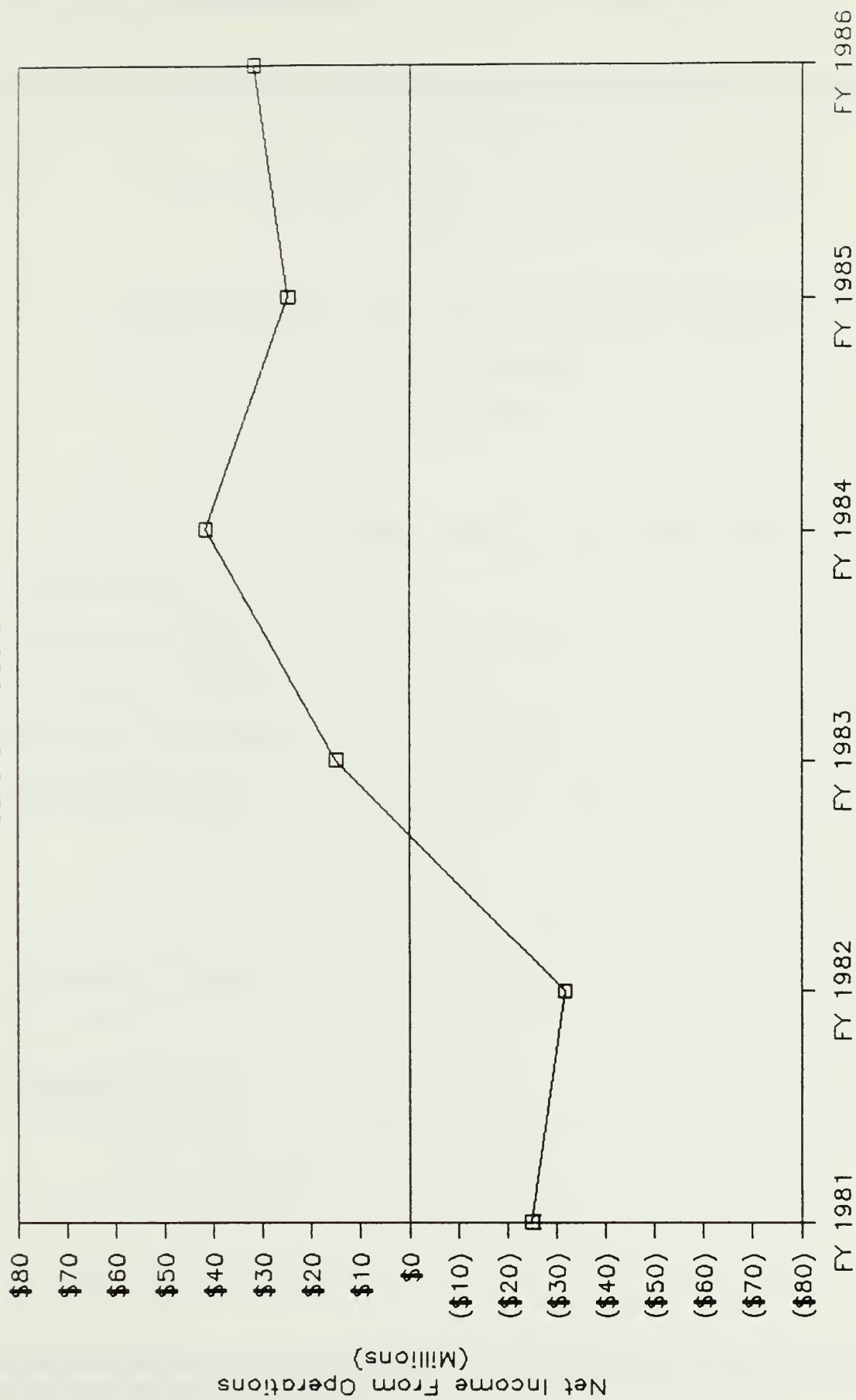


Figure 1B



MASSACHUSETTS RATE SETTING COMMISSION

Table 2

Acute Hospital Profit and Loss Rates, 1981-86

By Rate Category

Fiscal Year

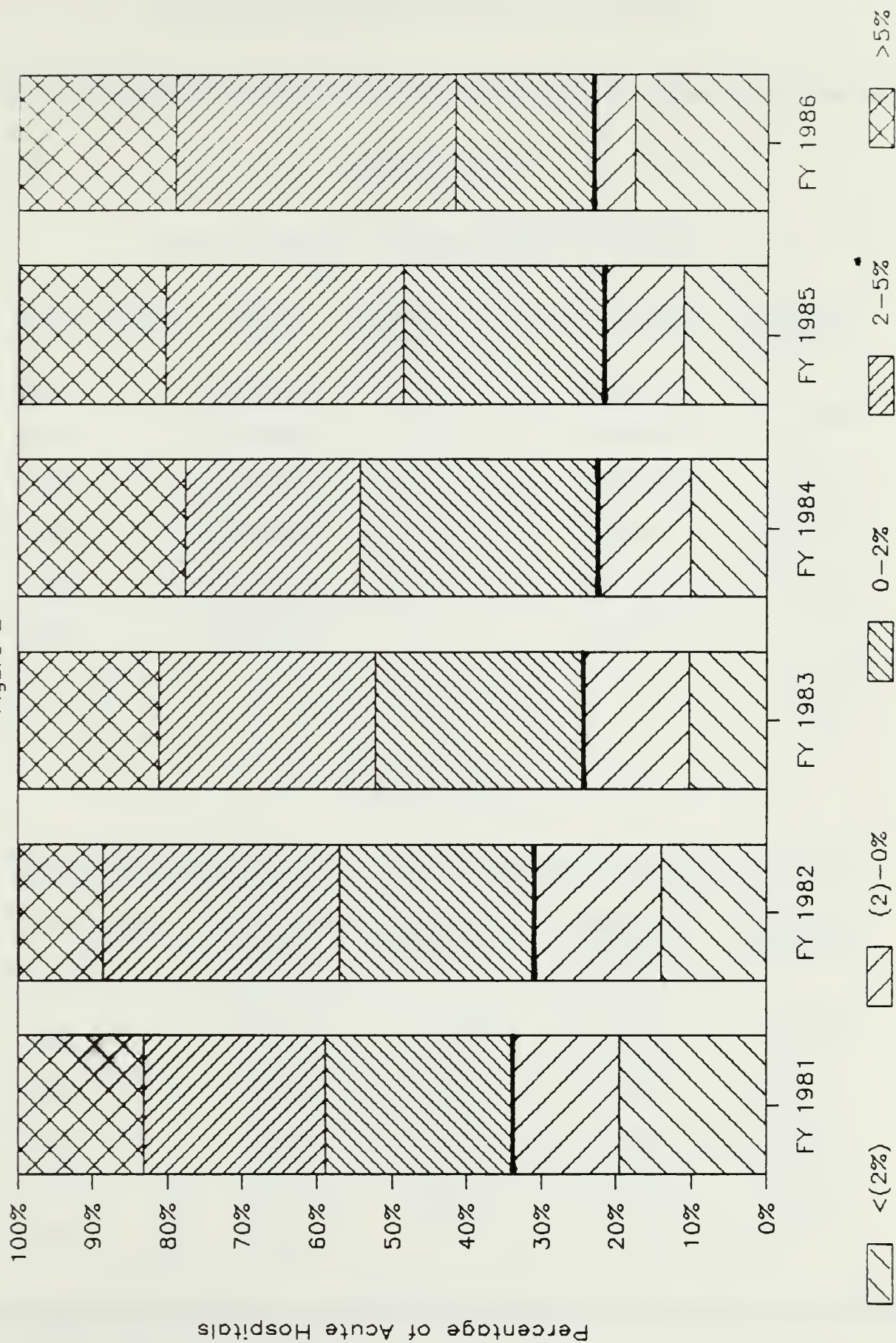
	1981	1982	1983	1984	1985	1986
Total Margin						
Greater Than 5%	16.8%	11.2%	18.7%	22.4%	19.6%	20.8%
Between 2% and 5%	24.3	31.7	28.9	23.3	31.7	37.5
Between 0% and 2%	25.3	26.1	28.0	31.9	27.1	18.7
HOSPITALS WITH POSITIVE MARGIN	66.4	69.2	75.7	77.6	78.5	77.1
Between -2% and 0%	14.0	16.8	14.0	12.1	10.3	5.2
Less Than -2%	19.6	14.0	10.3	10.2	11.2	17.7
HOSPITALS WITH NEGATIVE MARGIN	33.6	30.8	24.3	22.3	21.5	22.9

Note: The above tables exclude Boston City Hospital. The FY1986 percentages (only) are based on the available sample of 96 hospitals, while all other entries are based on the full sample of 108 hospitals.



# Acute Hospital Profit and Loss Rates

Figure 2





MASSACHUSETTS RATE SETTING COMMISSION

Tables 3A/3B

Acute Hospital Volume Trends, 1981-86

Fiscal Year	Days	Percent Change	Discharges	Percent Change
1981	7,676,140	0.30%	912,214	0.96%
1982	7,697,623	-2.26	920,989	0.60
1983	7,523,867	-3.11	926,518	-1.00
1984	7,286,083	-6.34	917,285	-4.01
1985	6,823,846	-7.34	880,509	-1.95
1986	6,324,632		863,342	

Tables 3C/3D

Acute Hospital Occupancy Rates and Length of Stay, 1981-86

Fiscal Year	Occupancy Rate	Percent Change	Length of Stay	Percent Change
1981	81.43%	-1.26%	8.41	-0.59 %
1982	80.40	-2.95	8.36	-2.87
1983	78.03	-3.70	8.12	-2.22
1984	75.14	-6.56	7.94	-2.39
1985	70.21	-6.37	7.75	-5.42
1986	65.74		7.33	

Note: All of the above tables exclude Boston City Hospital.





# Volume Trends -- Total Patient Days

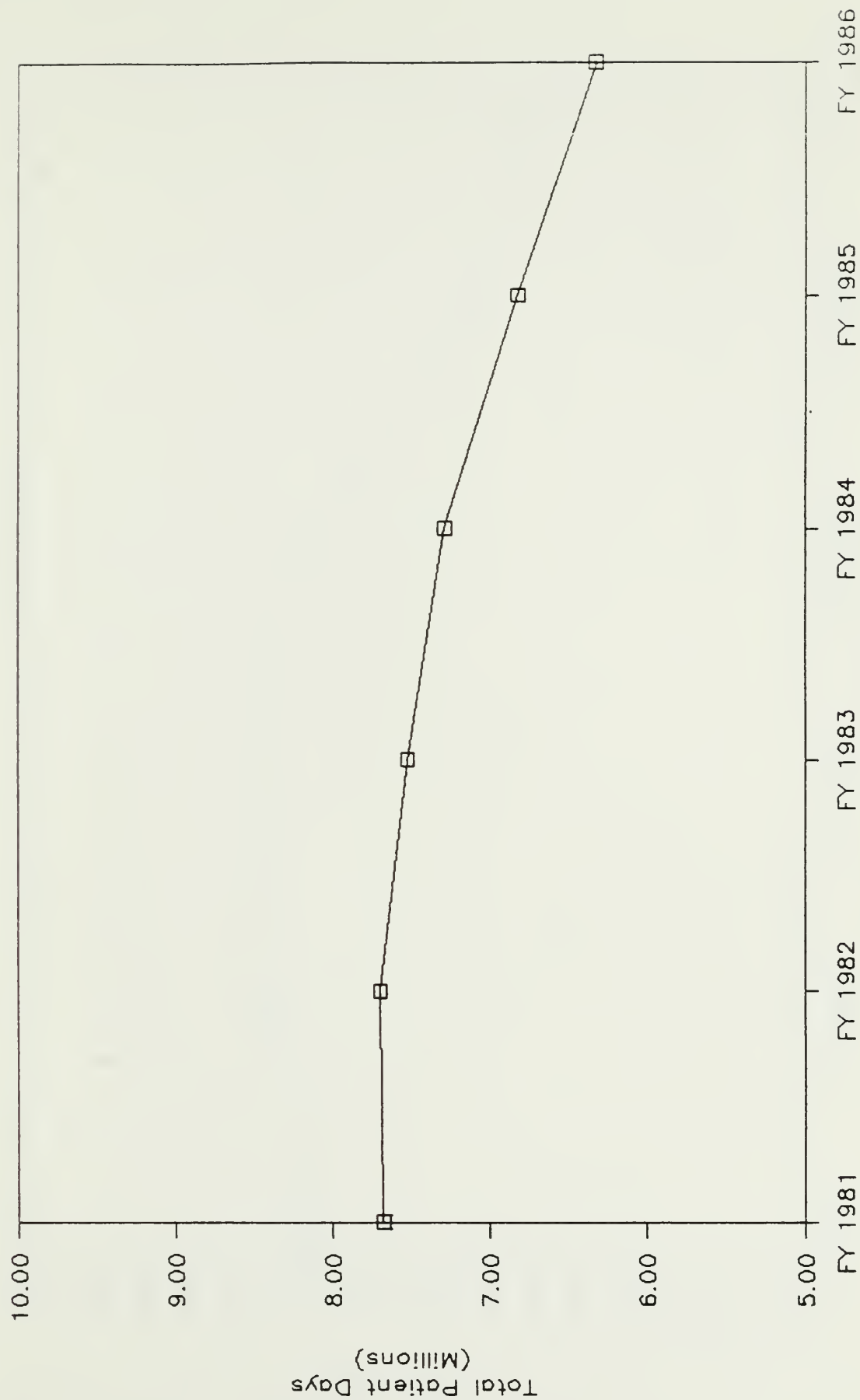


Figure 3A



# Volume Trends -- Patient Discharges

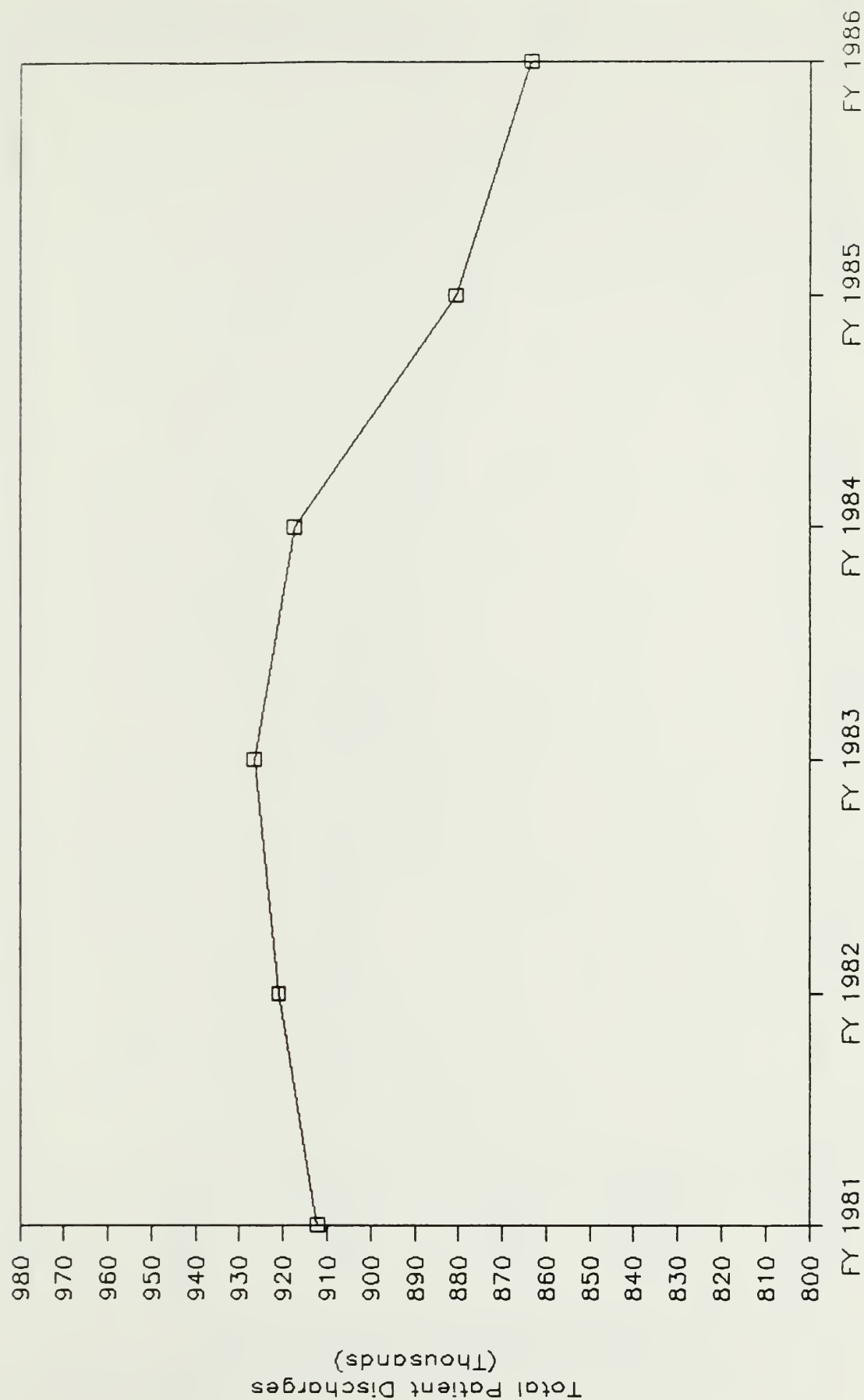


Figure 3B



# Acute Hospital Occupancy Rates

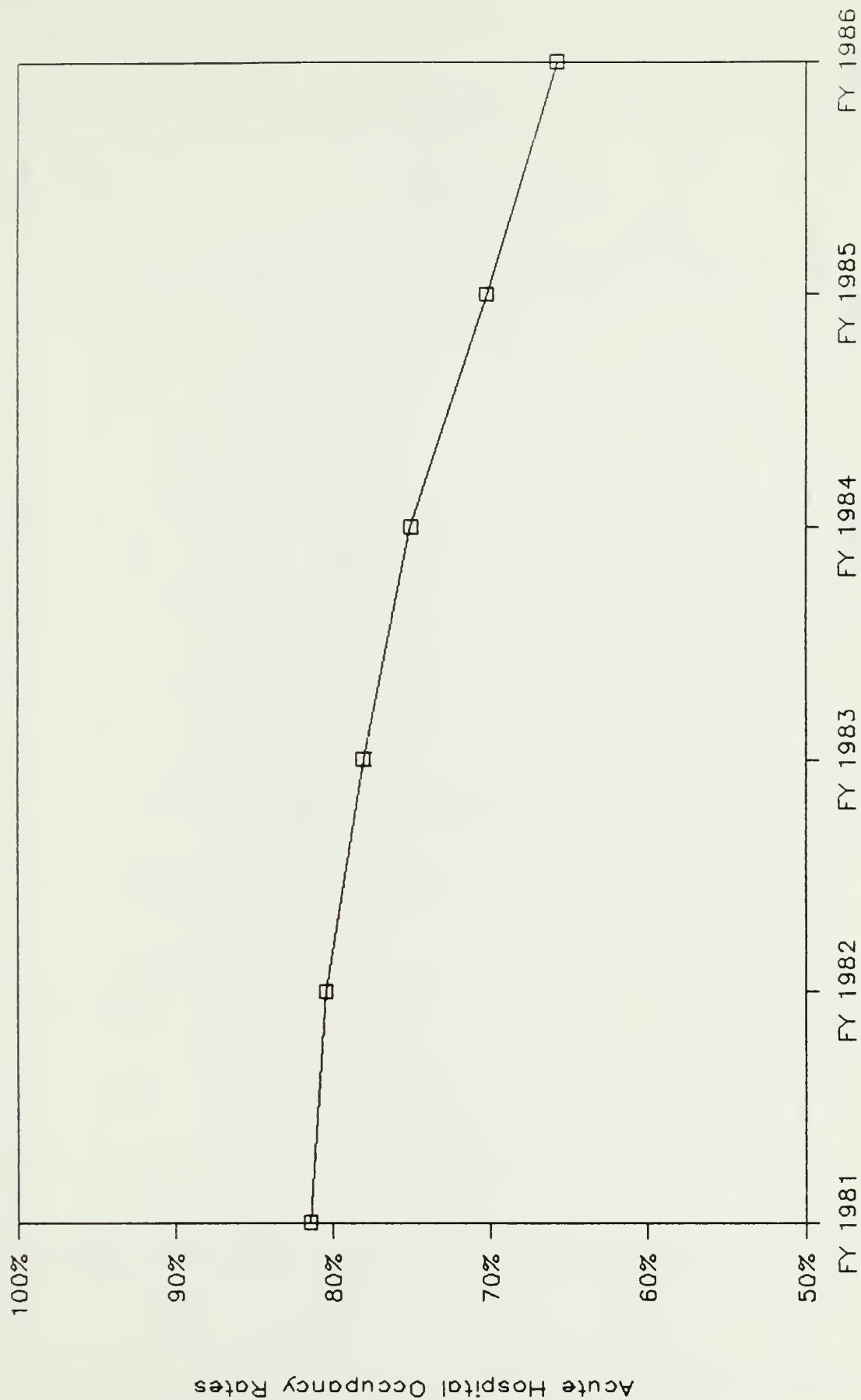


Figure 3C





# Acute Hospital Avg. Length Of Stay

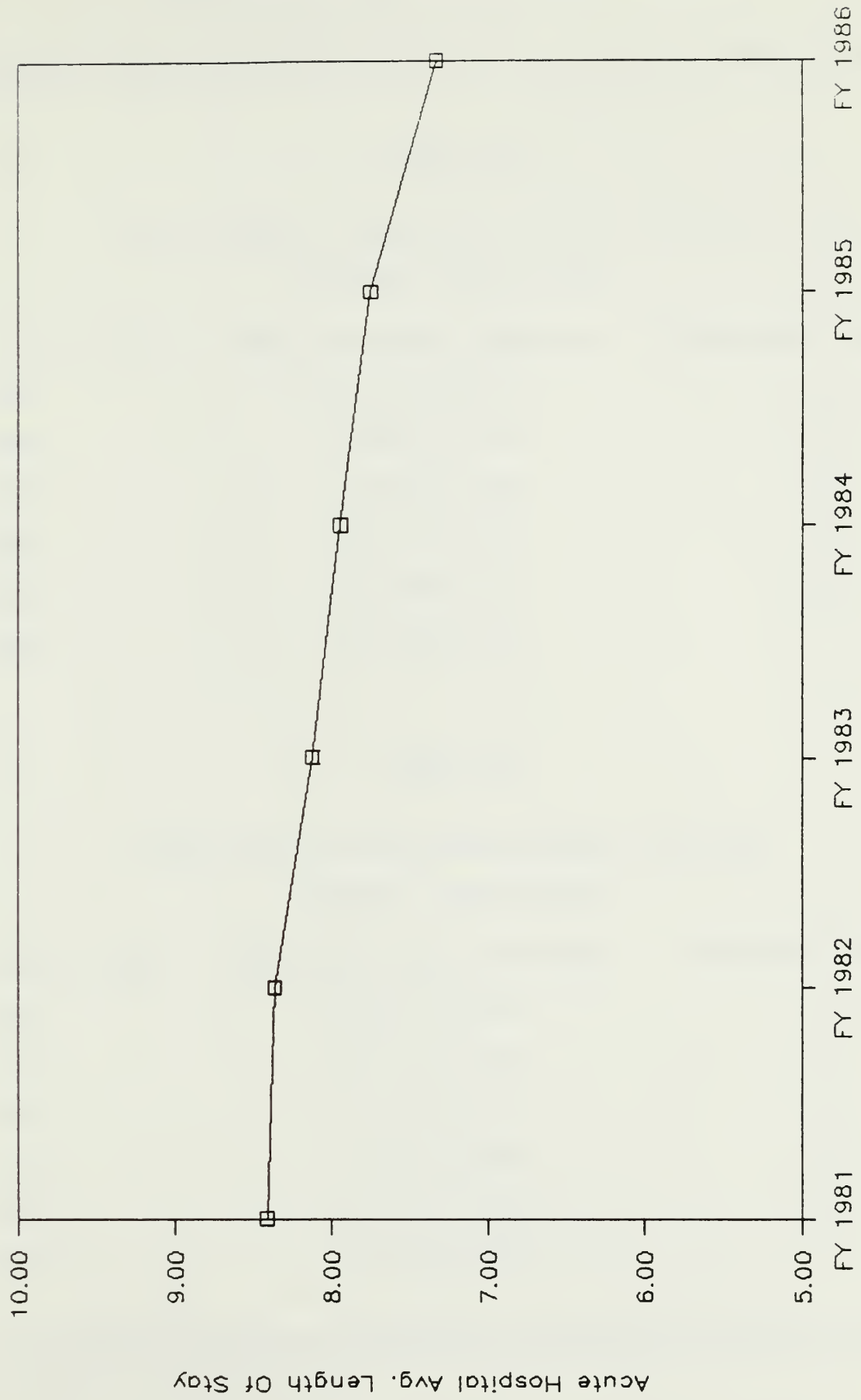


Figure 3D



MASSACHUSETTS RATE SETTING COMMISSION

Table 4A

Acute Hospital Operating Expenses, 1981-86

Constant 1986 Dollars

Fiscal Year	Total Operating Expenses	Percentage Change
1981	\$3,918,743,882	
1982	4,185,417,558	6.81%
1983	4,319,360,352	3.19
1984	4,372,736,505	1.24
1985	4,418,296,043	1.04
1986	4,507,098,100	2.01

Table 4B

Acute Hospital Operating Revenue, 1981-86

Constant 1986 Dollars

Fiscal Year	Total Operating Revenues	Percent Change
1981	\$3,893,788,132	
1982	4,153,613,591	6.67 %
1983	4,334,279,662	4.35
1984	4,414,313,300	1.85
1985	4,443,225,311	0.65
1986	4,538,928,300	2.15

Note: All of the above tables exclude Boston City Hospital.



# Acute Hospital Operating Expenses

Constant 1986 Dollars

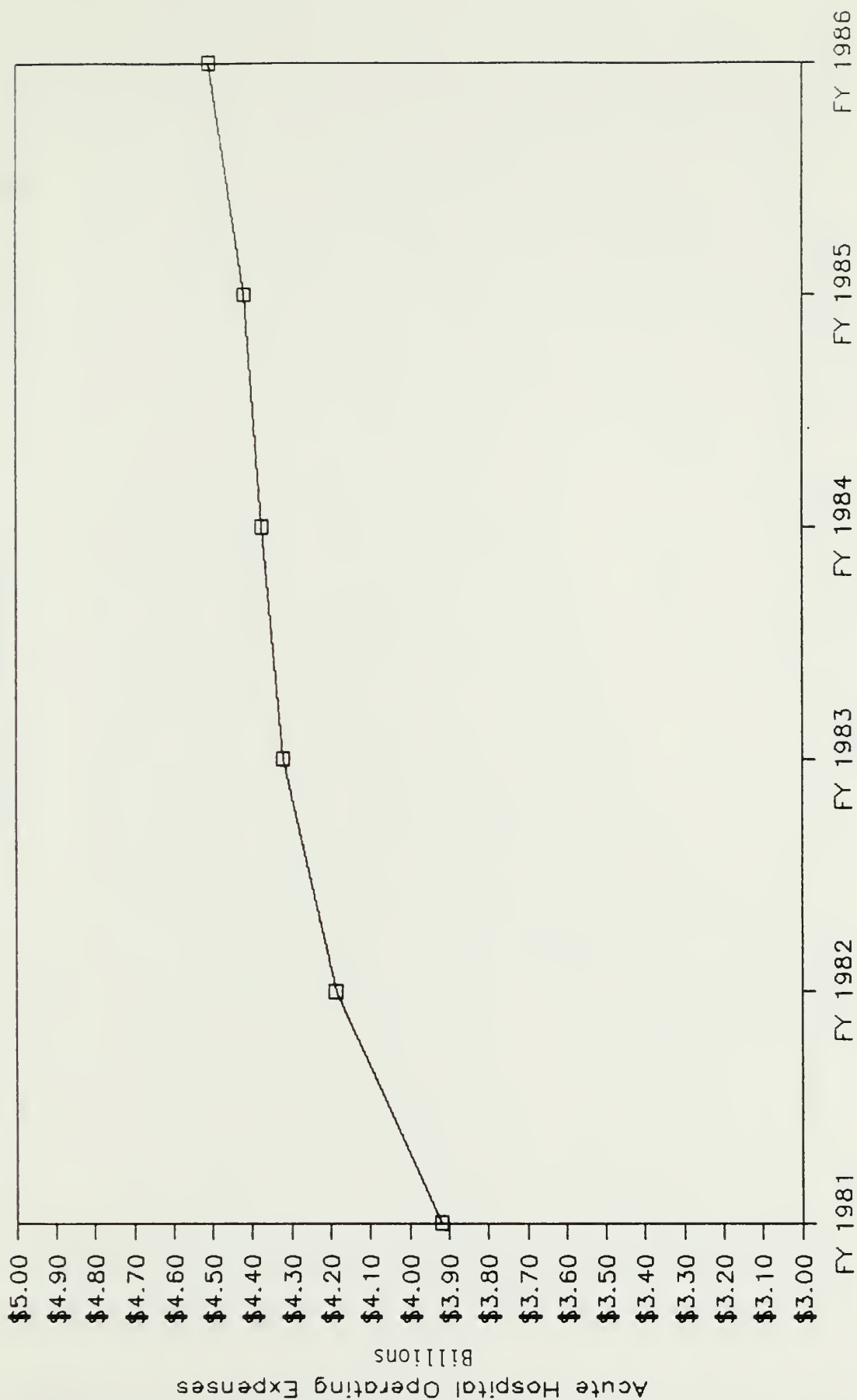


Figure 4A



# Acute Hospital Operating Revenue

Constant 1986 Dollars

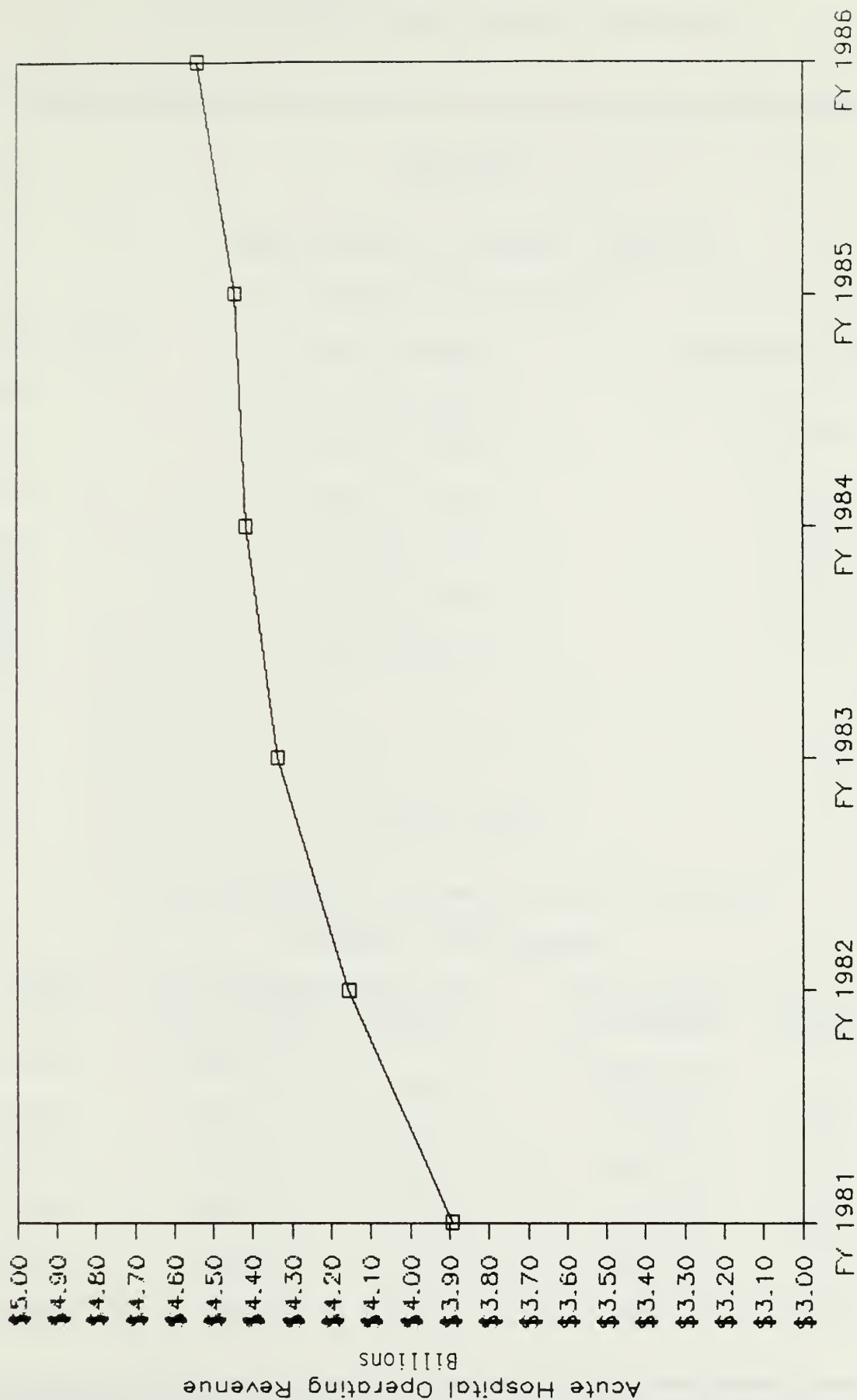


Figure 4B





MASSACHUSETTS RATE SETTING COMMISSION

Table 5A

Acute Hospital Charges, 1981-86

Constant 1986 Dollars

Fiscal Year	Total Charges	Percentage Change
1981	\$4,365,592,000	
1982	4,806,332,000	10.10%
1983	4,961,482,000	3.23
1984	5,040,438,000	1.59
1985	5,181,421,000	2.80
1986	5,394,192,000	4.11*

Tables 5B/5C

Acute Hospital Charges Per Unit, 1981-86

Constant 1986 Dollars

Fiscal Year	Per Adjusted Patient Day	Percent Change	Per Adjusted Discharge	Percent Change
1981	\$459.34		\$3856.14	
1982	501.71	9.22%	4185.69	8.55%
1983	524.27	4.50	4244.30	1.40
1984	545.15	3.94	4313.60	1.63
1985	584.94	7.30	4513.70	4.64
1986	641.30	9.64*	4665.09	3.35*

NOTE: All of the above tables exclude Boston City Hospital (BCH). The 1985-86 percent changes are distorted by this exclusion due to the implementation of the uncompensated care pool, which had the effect of reducing charges at BCH while increasing charges at other hospitals. If BCH were included, the percent changes for 1985-86 would be 1.05% for total charges, 6.65% for charges per adjusted patient day, and 0.62% for charges per adjusted discharge. In addition, the recent increases in charges per adjusted day and discharge may be partly due to acceleration in the rate of case mix change.



# Acute Hospital Charges

Constant 1986 Dollars

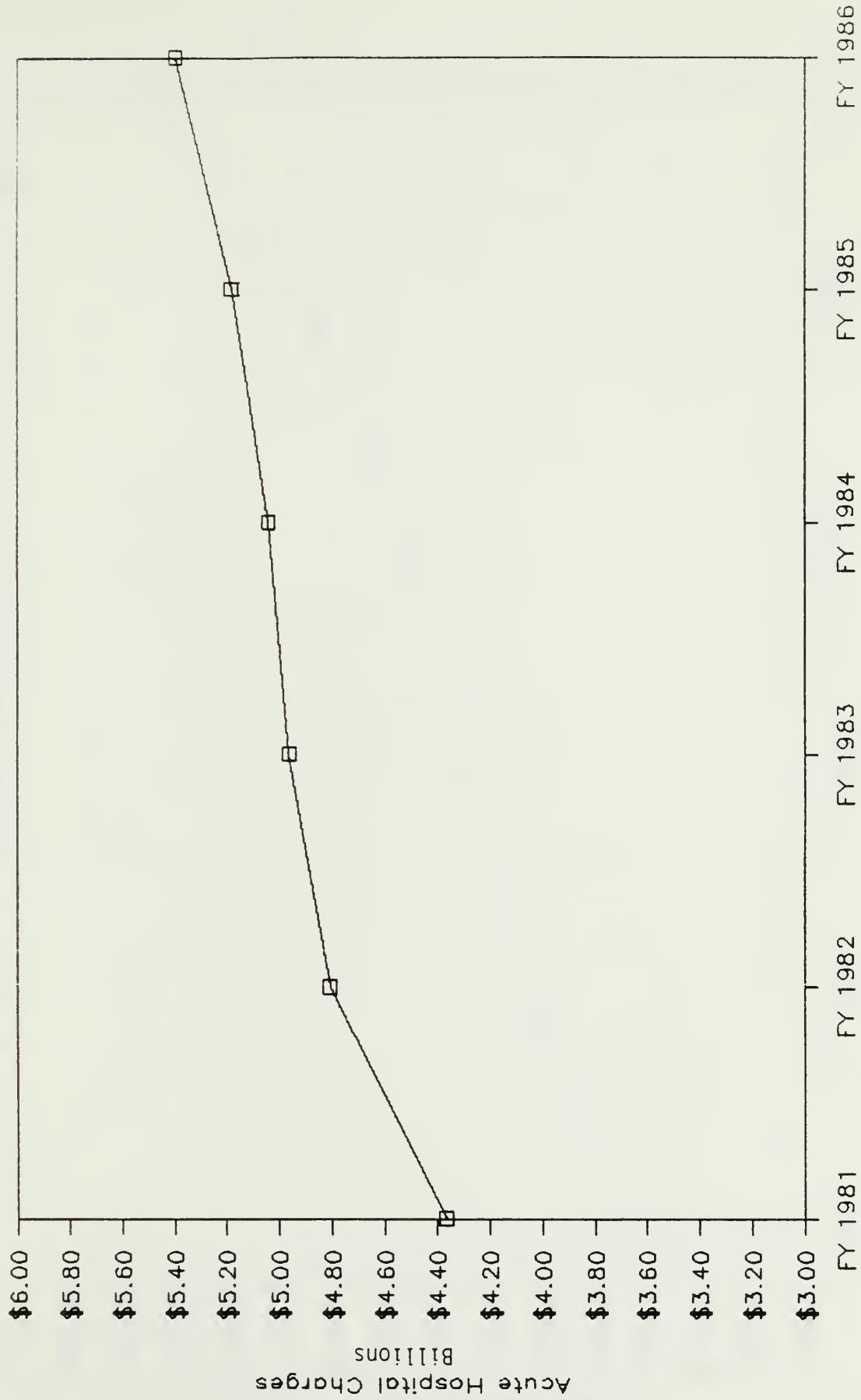


Figure 5A



# Charges Per Adjusted Patient Day

Constant 1986 Dollars

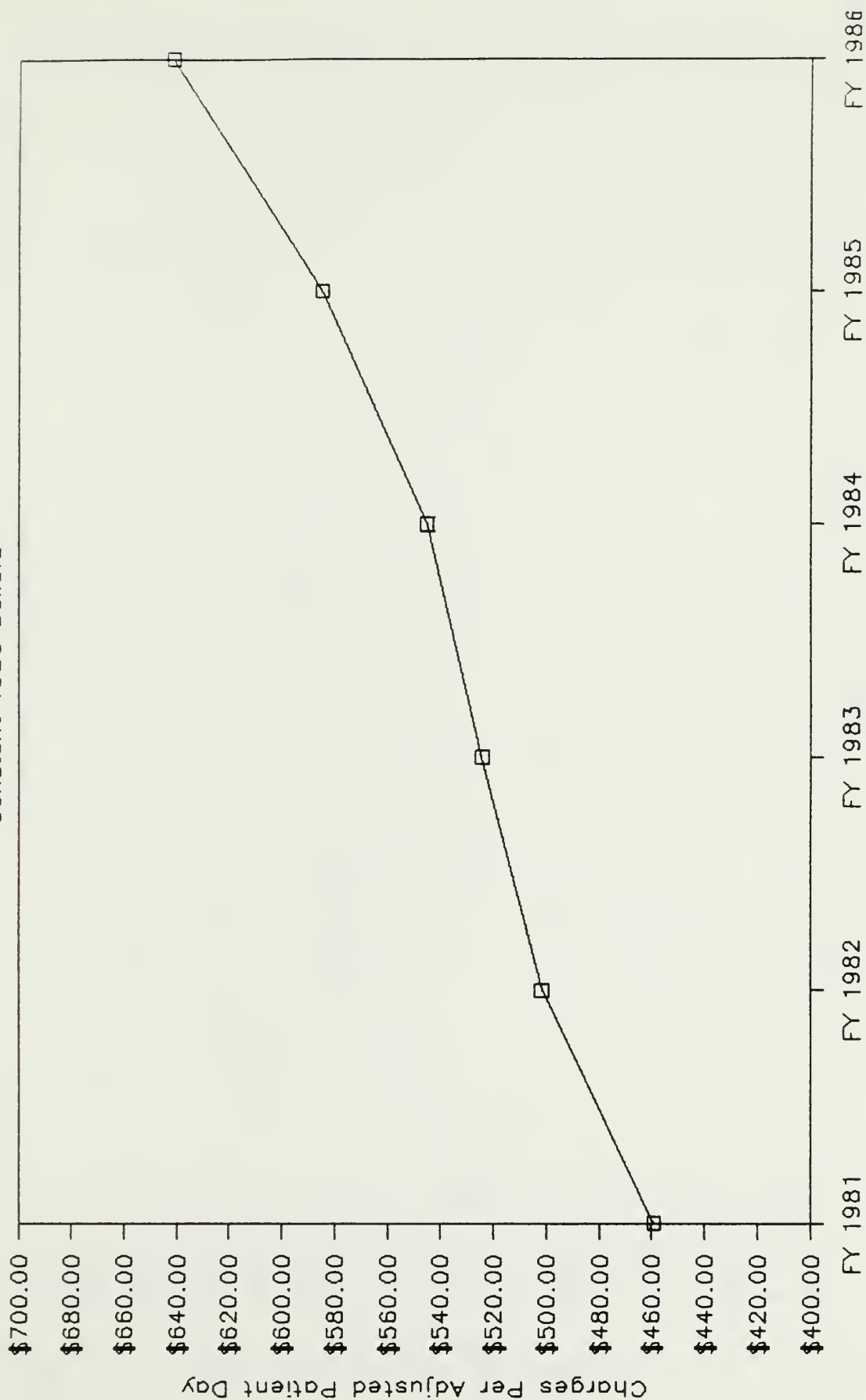


Figure 5B



# Charges Per Adjusted Discharge

Constant 1986 Dollars

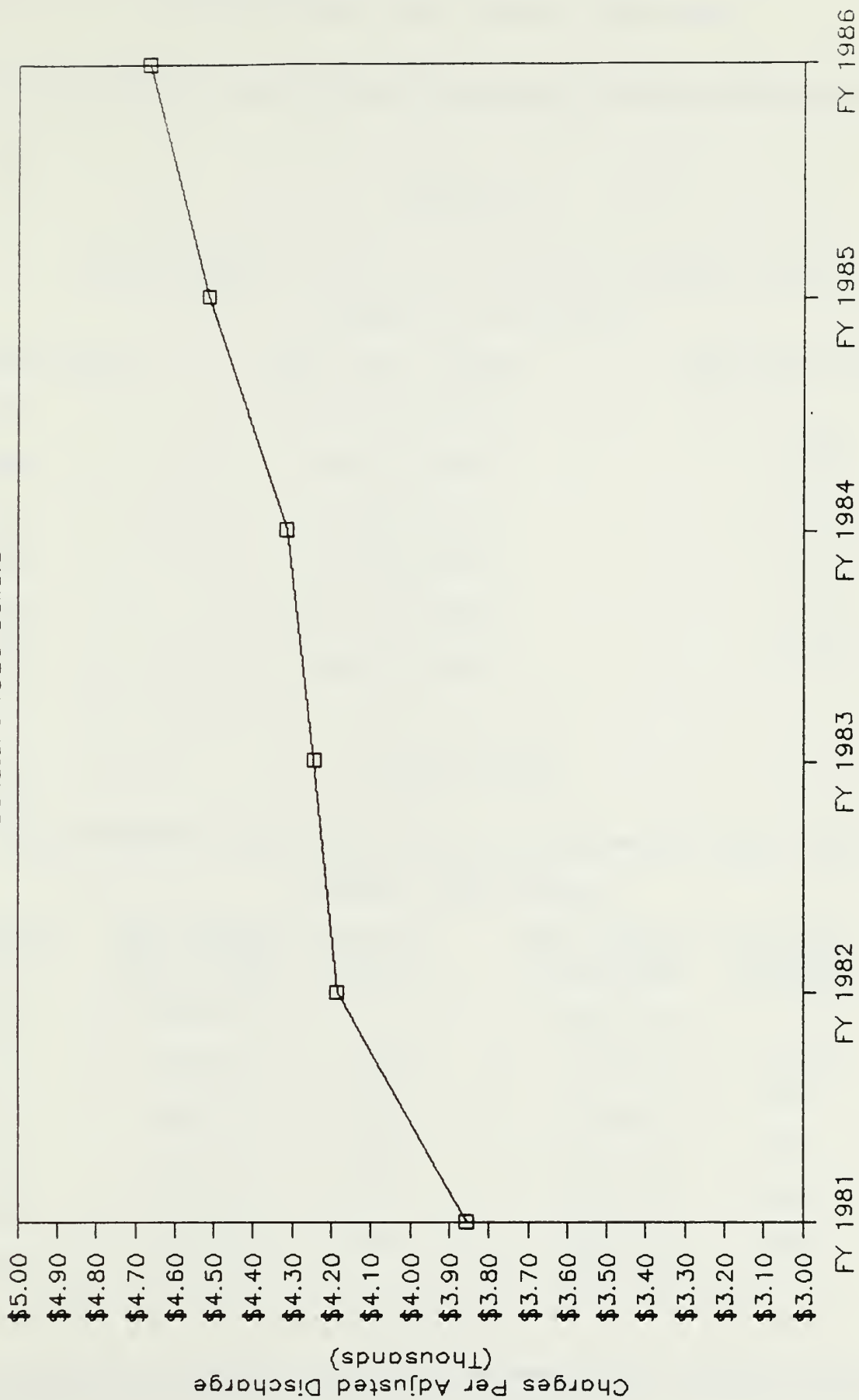


Figure 5C





MASSACHUSETTS RATE SETTING COMMISSION

Table 6A

Acute Hospital Net Patient Service Revenue, 1981-86

Constant 1986 Dollars

Fiscal Year	Total Net Revenue	Percentage Change
1981	\$3,563,455,000	7.96%
1982	3,847,150,000	4.12
1983	4,005,801,000	2.18
1984	4,092,990,000	1.16
1985	4,140,458,000	1.98
1986	4,222,438,000	

Tables 6B/6C

Acute Hospital Net Patient Service Revenue Per Unit, 1981-86

Constant 1986 Dollars

Fiscal Year	Per Adjusted Patient Day	Percent Change	Per Adjusted Discharge	Percent Change
1981	\$374.94		\$3147.61	
1982	401.59	7.11%	3350.37	6.44%
1983	423.28	5.40	3426.77	2.28
1984	442.48	4.54	3502.78	2.22
1985	467.43	5.64	3607.07	2.98
1986	501.99	7.39	3651.72	1.24

NOTE: All of the above tables exclude Boston City Hospital. Recent increases in net revenue per adjusted day and adjusted discharge may be partly due to acceleration in the rate of case mix change.



# Net Patient Service Revenue

Constant 1986 Dollars

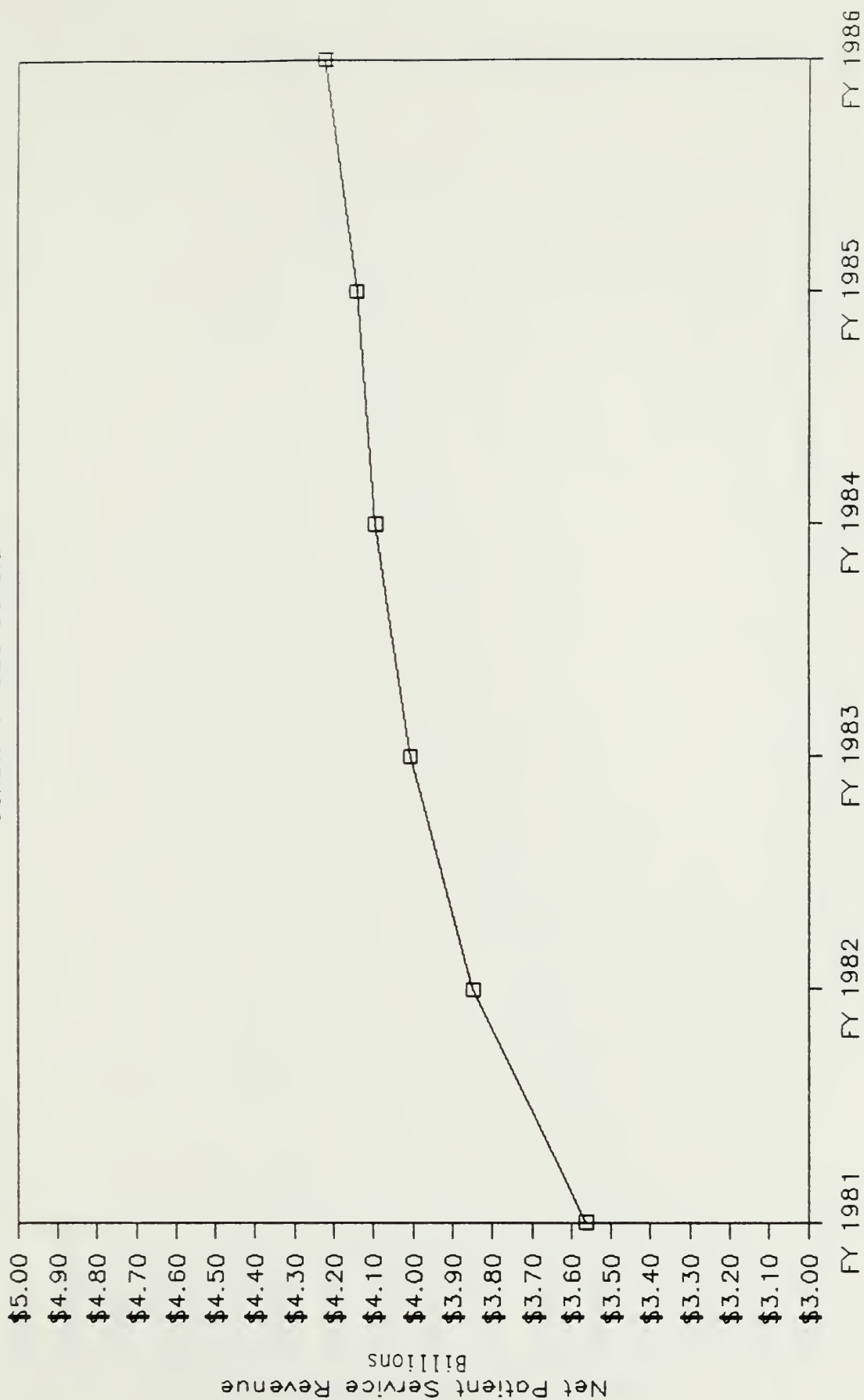


Figure 6A



# Net Pat. Ser. Rev. Per Adj. Patient Day

Constant 1986 Dollars

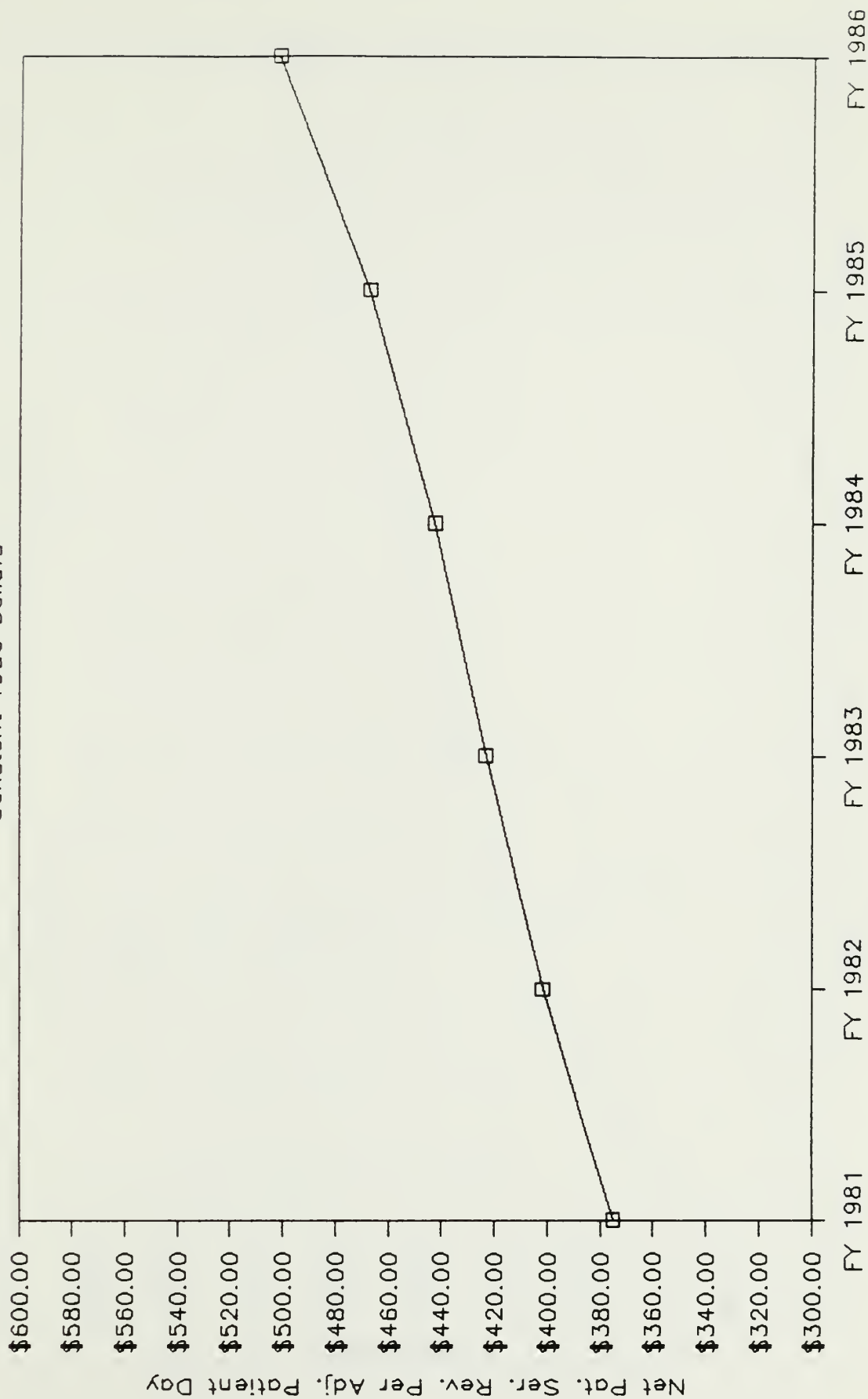


Figure 6B



# Net Pat. Ser. Rev. Per Adj. Discharge

Constant 1986 Dollars

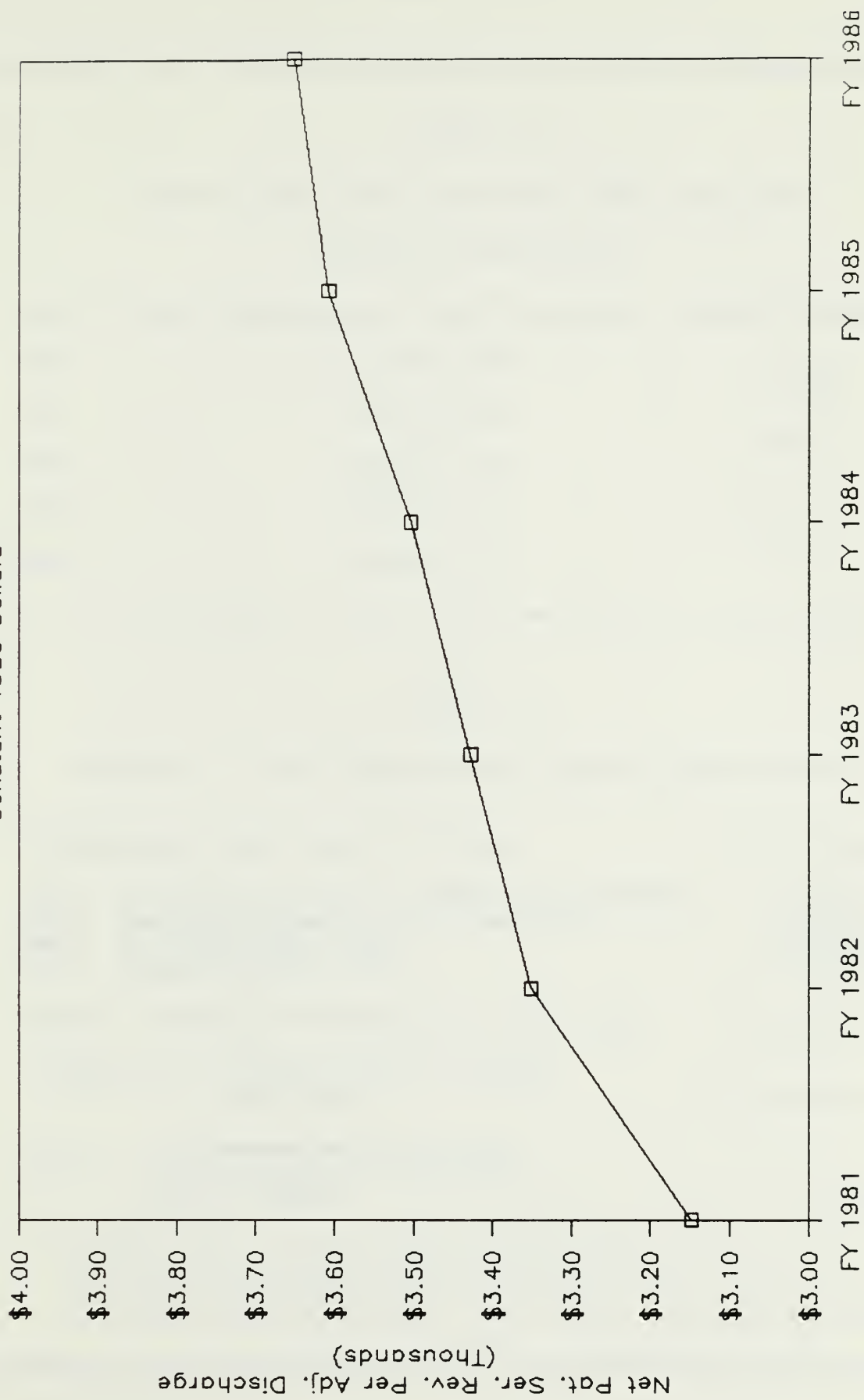


Figure 6C





MASSACHUSETTS RATE SETTING COMMISSION

Table 7A

Bad Debt and Free Care "MAC" Costs, 1982-86

Constant 1986 Dollars

Fiscal Year	Bad Debt and Free Care Costs	Percent Change
1982	\$203,660,955	
1983	233,978,654	14.89%
1984	231,831,916	-0.92
1985	282,809,538	21.99
1986	315,230,169	11.46

Note: "MAC" costs are allowable costs as defined for reimbursement purposes under the Chapter 372/574 system.

Table 7B

Summary of 1986 Uncompensated Care Pool Calculation<sup>1</sup>

Uncompensated Care Costs as Filed	\$315,359,000 <sup>2</sup>
Less: Preliminary Partial Audit Adjustments	8,797,000 <sup>3</sup>
Less: Medicaid Payments for Free Care	14,238,000
Less: Private Sector Cap	26,137,000 <sup>4</sup>
Less: Administrative Cost	100,000
Equals: Adjusted Uncompensated Care Costs	266,087,000
Divided By: Private Sector Patient Care Costs	2,181,554,000
Equals: Uncompensated Care Costs As Percentage of Private Sector Costs	12.20%

NOTES: <sup>1</sup> As of March 1, 1987.

<sup>2</sup> The slight variance in as-filed 1986 uncompensated care costs between Tables 7A and 7B is due to differences in projection methodology and the inclusion of working capital cost in the pool.

<sup>3</sup> Reflects preliminary audit results for fifty hospitals as of March 1987. Estimated audit adjustments for all hospitals is between \$15 million and \$17 million.

<sup>4</sup> The private sector cap applies only to Boston City Hospital and is computed by a legislatively defined formula.



# Bad Debt And Free Care "MAC" Costs

Constant 1986 Dollars

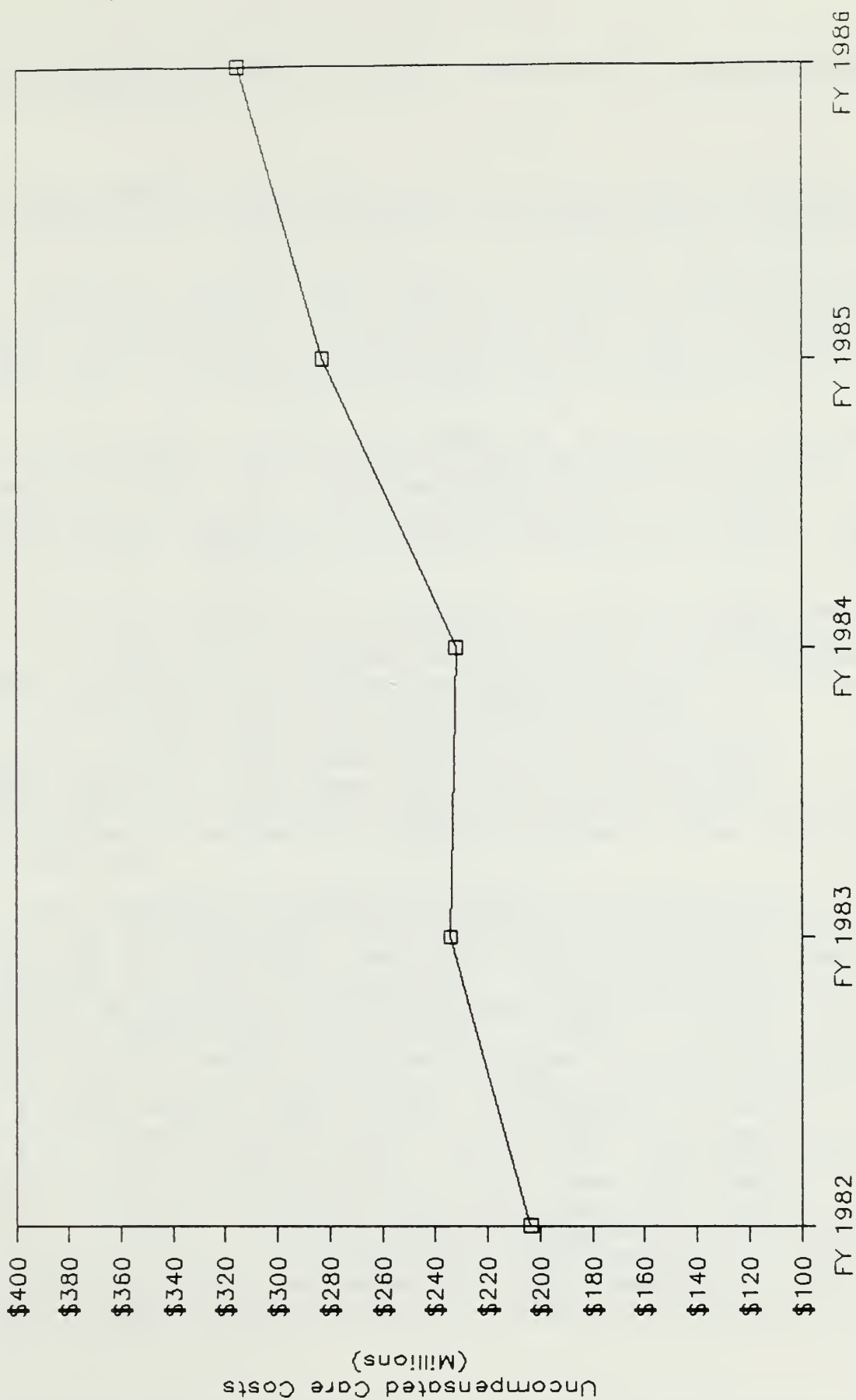


Figure 7A



## TECHNICAL APPENDIX

This appendix describes the data sources and procedures used to generate the tables included in the main body of the report. Generally, the following methods and procedures were used:

1. Except for the bad debt/free care analysis, data was taken from the cost reports filed by each hospital with the Rate Setting Commission at the end of each fiscal year. In most cases, the cost report was the RSC-403; for the municipal hospitals, the cost report for FY81 was the RSC-401.
2. All bad debt and free care data for 1983-86 was taken from the MAC reports filed with Blue Cross and the Rate Setting Commission every year, under HA-29 and HA-30. For most hospitals this source was also employed in 1982; however, for the municipal hospitals the RSC-403 was used for 1982 bad debt and free care information.
3. All acute hospitals (107 in FY86, 108 in all other years) were included in every analysis year, with two exceptions:
  - a. Boston City Hospital was excluded from all analyses other than that for bad debt and free care, due to data problems and its atypical position in the hospital system.
  - b. RSC-403 data was lacking in FY86 for ten other hospitals. For Table 2 and Figure 2, the percentage relationships for FY86 were thus based on 96 hospitals. For all other tables and figures, a special procedure (described below) was devised to estimate the aggregate values of the variables for this year.
4. The estimation procedure for FY86 was straightforward. For FY85, for each variable, two totals were calculated: one including all hospitals, and one including only those hospitals for which FY86 data was available. The all-hospital total was divided by the total from the partial sample to yield a ratio R, which we assumed would also prevail in FY86. In this manner, the FY86 all-hospital value was computed by multiplying the total from all available hospitals times the FY85 all-hospital to partial sample ratio R. Thus, for example, if the 96 hospitals for which FY86 data was available had ninety percent of all inpatient days in FY85 ( $R=1.00/.90$ ), and these hospitals had five million patient days in FY86, then the computed all-hospital total for FY86 would have been five million times R, or 5,555,555. The only partial exception to this approach was for net income from operations; this variable was computed by subtracting total expenses from total operating revenue, with both of these component parameters estimated according to the method described above.



5. The inflation index used to convert all values to 1986 constant dollars was the latest revision of the Boston consumer price index (all-urban). The index used in this report was computed on a hospital fiscal year (October through September) rather than a calendar year basis.

6. Adjusted hospital days and discharges were computed according to the standard American Hospital Association methodology, according to the following formula (AHA Hospital Statistics, 1984 Edition, p.11):

$$\text{Adjusted Patient Days} = \text{Inpatient Days} * \left( \frac{\text{Total Charges}}{\text{Inpatient Charges}} \right)$$

and equivalently for adjusted discharges.

Adjusted days and discharges are used to create a measure of volume that reflects the extent of outpatient as well as inpatient activity. Under this formula, an increase in the ratio of outpatient to total charges will cause an increase in adjusted days and discharges. Thus, these measures of total volume will not be affected by a change in the relative importance of the hospital outpatient sector.



